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## Claims

1. Method for the analysis of neuronal activities in neuronal areas by using signals describing the neuronal activities, wherein

- 5    - the signals are determined, whereby each signal describes the neuronal activity in one of the neuronal areas,
- a matchable coupling forms the basis of only some of the signals, said matchable coupling being described by using matchable coupling variables which describe a statistical relationship
- 10    between the matchably coupled signals,
- probabilities for an occurrence of the signals are determined, whereby a statistical distribution forms the basis of the occurrence of the signals,
- the matchable coupling variables are determined by an optimization
- 15    of the probabilities and are hence matched and
- the neuronal activities are analyzed by using the matchable coupling variables,

characterized in that

- a matchable coupling forms the basis of all the signals, said
- 20    matchable coupling being described by using matchable coupling variables whereby all the matchable coupling variables are determined in the optimization of probabilities and hence matched.

2. Method according to Claim 1,

25    wherein the statistical distribution is described by a statistical distribution of the first order, in particular by a normal distribution, or by a statistical distribution of a higher order, in particular by an Edgeworth expansion, or by a sum of normal distributions.

30    3. Method according to any one of the preceding Claims, wherein the optimization is performed by means of a maximum likelihood estimation method.

35    4. Method according to any one of the preceding Claims,

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wherein a relationship between the statistical relationship and the statistical distribution is taken into consideration as an auxiliary condition in the optimization.

- 5     5. Method according to any one of the preceding Claims,  
wherein external influences on the signals are taken into  
consideration in the statistical relationship.
6. Method according to any one of the preceding Claims,  
10     wherein the signals are determined by measurement.
7. Method according to any one of the preceding Claims,  
wherein the signal is a BOLD signal.
- 15     8. Method according to any one of the preceding Claims,  
wherein the neuronal area is an area of the brain of a person.
9. Method according to any one of the preceding Claims,  
used in an fMRI technique in which BOLD signals are analyzed,  
20     wherein the signal is one of the BOLD signals.
10. Method according to the preceding Claim,  
25     used for a diagnosis of a functional disorder in an area of the  
brain using the fMRI technique in such a way that the diagnosis is  
made by using the analysis of the BOLD signals.
11. Arrangement for the analysis of neuronal activities in neuronal  
30     areas by using signals describing the neuronal activities comprising  
units which are functionally in contact with one another and which  
are equipped in such a way that
- the signals can be determined, whereby each signal describes the  
neuronal activity in one of the neuronal areas,
  - 35     - a matchable coupling can form the basis of only some of the  
signals, said matchable coupling being described by using

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matchable coupling variables which describe a statistical relationship between the matchably coupled signals,

- probabilities for an occurrence of the signals can be determined, whereby a statistical distribution forms the basis of the occurrence of the signals,

- the matchable coupling variables can be determined by an optimization of the probabilities and hence matched and
- the neuronal activities can be analyzed by using the matchable coupling variables,

characterized in that

- a matchable coupling can form the basis of all the signals, said matchable coupling being described by using matchable coupling variables, whereby all the matchable coupling variables can be determined in the optimization of probabilities and hence matched.

12. Computer program product which comprises a computer-readable storage medium on which a program is stored which, after it has been loaded into a memory of the computer, enables a computer to perform the following steps for the analysis of neuronal activities in

neuronal areas by using signals describing the neuronal activities,

- the signals are determined, whereby each signal describes the neuronal activity in one of the neuronal areas,
- a matchable coupling forms the basis of only some of the signals, said matchable coupling being described by using matchable coupling variables which describe a statistical relationship between the matchably coupled signals,

- probabilities for an occurrence of the signals are determined, whereby a statistical distribution forms the basis of the occurrence of the signals,

- the matchable coupling variables are determined by an optimization of the probabilities and are hence matched and

- the neuronal activities are analyzed by using the matchable coupling variables,

characterized in that

- a matchable coupling forms the basis of all the signals, said matchable coupling being described by using matchable coupling

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variables whereby all the matchable coupling variables are determined in the optimization of probabilities and hence matched.

13. Computer-readable storage medium on which a program is stored

5 which, after it has been loaded into a memory of the computer, enables a computer to perform the following steps for the analysis of neuronal activities in neuronal areas by using signals describing the neuronal activities,

10 - the signals are determined, whereby each signal describes the neuronal activity in one of the neuronal areas,

- a matchable coupling forms the basis of only some of the signals, said matchable coupling being described by using matchable coupling variables which describe a statistical relationship between the matchably coupled signals,

15 - probabilities for an occurrence of the signals are determined, whereby a statistical distribution forms the basis of the occurrence of the signals,

- the matchable coupling variables are determined by an optimization of the probabilities and are hence matched and

20 - the neuronal activities are analyzed by using the matchable coupling variables,

characterized in that

25 - a matchable coupling forms the basis of all the signals, said matchable coupling being described by using matchable coupling variables whereby all the matchable coupling variables are determined in the optimization of probabilities and hence matched.

14. Computer program with program code means in order to perform all the steps according to Claim 1 if the program is run on a computer.

30 15. Computer program with program code means according to Claim 14 which are stored on a computer-readable data medium.

35 16. Computer program product with program code means stored on a machine-readable medium, in order to perform all the steps according to Claim 1 if the program is run on a computer.